Device for parking brake system dependent on the ignition system

The present invention relates to a device of a parking brake system for vehicles, said parking brake comprises a brake lever that can reset the brake system between an active brake position and a neutral position, and also a transmission mechanism to make it possible to reset the brake lever from the brake position, as the mentioned operation of the transmission mechanism is dependent on the ignition system of the vehicle being activated/turned on.

There are previously known solutions where the use of a parking brake is controlled by the electrical system of a vehicle, and reference is made to US Patents 4,519,653, 5,134,764 and 5,624,352. However, the known solutions are not related to the use of a brake lever.

It is an aim of the invention to provide a new solution for the operation of a brake lever.

The aim of the invention is primarily to be able to safeguard the vehicle against unintended use by providing a device that influences the use of the parking brake of the vehicle, for example, as a result of an accident.

Thus, it is an aim of the present invention to provide a new device that shall be able to prevent the handbrake of a vehicle being unintentionally released. Such a release can be due to a person trying to steal the car.

It is also an aim of the invention to be able to prevent children being able to release the parking brake so that the vehicle starts to roll.

Most cars have their own parking brake system in the form of a separate drum-brake that operates on the back wheels, but it can also be formed in other ways. This brake system is constructed completely independently of the car's main brake system, and is only intended for use when the car is parked, but it is also used as an emergency brake.

A parking brake can also comprise a handbrake, as it is formed as a lever that is operated by the driver's hand. The brake lever is either placed in the dashboard and is pulled out to a position where a locking pin locks the lever, or it is placed between the front seats and the brake is activated by it being pulled up.

The device according to the present invention is characterised in that a blocking appliance with a blocking peg that is in blocking engagement with the transmission mechanism when the appliance is not supplied with a voltage from the ignition system, and disengages from the blocking position with the mechanism when the appliance is supplied with a voltage.

The preferred embodiment of the invention appears in the subsequent claims 2-11.

According to the invention, the device is applied in a vehicle where the hand-operated lever is arranged to be pulled in the longitudinal direction between the two positions, or to be rotated around a fulcrum between the two positions.

The invention shall be explained in the following in connection with the latter solution with a retractable

handbrake lever placed between the seats. Thus, reference shall be made to the following figures, in which:

Figure 1 shows the standard system for a parking brake of a vehicle.

Figure 2 shows an enlarged side perspective of the inventive locking appliance in neutral position. The magnetic field coil is here applied with a voltage and the locking pin is disengaged from the locking position.

Figure 3 shows an enlarged side perspective of the inventive locking appliance in its relaxed position. Here, a voltage is not applied to the magnetic field coil and the locking pin is in its normal position. In this case the locking pin will prevent the use of the locking button.

Figure 4 shows the electrical connections for operation of the appliance according to the invention.

Figures 5 and 6 show the two different positions of the locking pin, and also the positions where the forward section 18 can push on the rear rod section 18b, and the other pin position where the pin blocks the displacement of the rod 18b by the rod 18a.

Initially, reference shall be made to figure 1 that illustrates a handbrake lever 10 which the driver can operate with his fingers gripping the forward handle section 12. At the rear, the lever 10 is rotary mounted in a fulcrum 14 in a base part 16 that is fixed to the floor of the vehicle (car).

A release rod 18 with a forward release button 20 runs alongside and freely inside the lever 10. The release rod 18 is divided in two with the forward rod section 18a running between the release button 20 and the locking pin 40 itself. A rear rod section 18b runs from the locking pin

40 and backwards. The forward and rear rod sections 18a, 18b are not connected to each other.

At the back, the rear rod section 18b is mounted at 19 in a locking catch 22 which is rotary mounted around an axis of rotation 24 in the rear frame part 11 of the lever 10 which, in the figure, lies outside the base part 16. The other end of the catch 22 comprises a locking peg 26 which can be brought into sequential engagement with correspondingly shaped notches/recesses 28 in the frame part 16. The catch 22 is spring loaded so that it is forced anti-clockwise so that the peg 26 falls down into the "nearest" notch 28. By the user pushing in the visible button 20 foremost on the lever 10 with the thumb, the locking peg of the catch 22 is flipped out of engagement in the base part 6 and the lever 12 can be pulled up in the direction of the arrow P.

The wire that operates the brake itself is shown by 30. It runs back to the brake drum/disk through the stocking 32. When the lever 10 is pulled up, simultaneously with the button 20 being depressed, the wire 30 is pulled forward and the brake is activated. When the button is released again, the peg 26 falls down into the nearest notch in the base. When the lever 10 is pulled up, it will be locked in this position.

In order to release the parking brake, the button 20 must be pushed in so that the peg 26 is pulled out of its engagement with the base 16.

According to a preferred embodiment, this parking brake construction is modified so that the catch element 22 can not be reset to a neutral position (where the peg 26 is released from the locking engagement) without the user/driver operating the ignition system of the vehicle.

Reference shall again be made to figure 1 that shows the abovementioned locking pin 40 arranged in a housing 42 in connection with the rod 10. The locking pin can be reset between two positions. In the one position the locking pin 40 is displaced in a blocking recess/notch 44 which is formed in an intermediate space between the forward and the rear rod sections 18a,b. The recess 44 is formed by a segment of the rear part of section 18a and the forward part of section 18b, respectively, being cut away, said recess can accommodate the locking pin 40 when it is activated into a position of locking the brake.

When the pin is in the recess 44, the button 20 can not be pushed in and the lever 10 remains standing in its locked position. However, this does not prevent rotation of the lever 10 in the pulling out direction (P). In the other position the locking pin 40 is pulled back and (forward section 18a off) the release rod 18 is free to be operated. The rear section 18b runs free all the time in relation to the locking pin.

The locking pin, with help of a pre-tension mechanism in the form of a spring connected to the housing is initially arranged to stand permanently in an upper locking position with the locking pin engaged with the locking notch 44 on the release rod 18.

The resetting of the locking pin 40 is carried out with the help of a magnetic field coil 50 that is wound around the locking pin 40 inside the housing 42. The two connecting contacts for the coil are denoted by A1 and A2, respectively. The magnetic field coil 50 is arranged to be supplied with electricity from the vehicle's electrical system. When the coil 50 is supplied with electricity, a magnetic field is created that pulls/pushes the pin 40 downwards and out of the engagement with the blocking notch 44. Then, the handbrake lever 10 can be moved freely and the brake is released when the button 20 is pushed in. The

pin must either be of a robust design which withstands direct engagement in the locking groove, or the locking pin with associated mechanism, must be constructed so that the movement and power is transmitted to a separate mechanism that engages with the locking notch in the release rod.

The magnetic field coil (50), which is called a solenoid in English, will be supplied with a voltage across the connecting points, designated + and - (plus and minus), respectively, when a voltage (current with a voltage) is applied to the control relay (7) for the magnetic field coil (50). The control relay for the magnetic field coil gets a voltage when the car's ignition is switched on (K2 closes). The circuits are made safe with fuses as shown in the drawing (1F1, 2F1, 3F1 and 3F2). The voltage that is applied to the relays and the magnetic field coil is a direct current (DC).
The system is formed so that when the ignition system of the vehicle is turned off, the locking pin will stand in the upper locking position and prevent the power transmission between the button 20 and the catch construction 22. The ignition system of the vehicle must be turned on for it to be possible to pull out the locking pin, as the magnetic field coil is controlled by the car's electrical system. When the ignition system is activated, the pin is pulled out (downwards) and the handbrake can be released.

At the same time, it shall be possible to pull the handbrake and activate the brake independently of the position of the locking pin 40. Therefore, it is not necessary to activate the ignition system of the vehicle to pull the handbrake. Thus the locking pin is normally in a locking position when the magnetic field coil is not supplied with a voltage.

The reason that the release rod 18 is divided into two 18a,b is that the rear section 18b must be able to run

freely because this will move according to the movements of the locking catch when the handbrake is pulled. The locking pin 40 shall, in its locked position (without voltage) prevent operation of the release button 20 by blocking the movement of the forward section 18a of the release rod 18a. The locking pin 40 does not prevent movement of the rear section of the release rod 18b, because this moves backwards and the locking pin 40 is placed in front.

The handbrake, as it is in today's cars, can be pulled without holding in the release button when pulling. Then one can hear the characteristic sound of the handbrake (the sound of the locking peg falling into each successive notch) In such cases, the release button and release rod will follow the movement of the locking peg and move for each notch the locking peg falls into.

The rear part of the release rod 18b will always follow the movement of the locking peg, while the forward part of the release rod 18a will only follow these movements when the locking pin 40 is out of locking position. One will hear the same sound from the handbrake when one pulls it, but if the locking pin 40 is in locking position one will experience that the release button does not move in step with the locking peg and the catch.

Figure 5 shows how the rod 18a impinges on the rod 18b and pushes this backwards, while figure 6 shows the rear rod section 18b being pulled backwards.

Figure 2 shows the situation where the ignition is turned on and the coil is supplied with a voltage so that the pin 40 is pulled out.

The situation where the ignition is turned off is shown in figure 3. No voltage is applied to the coil and the pin is pushed upwards in the groove (notch) 44 between the two rod sections 18a,b by the pre-tension.

To illustrate how the connection can be made, reference shall be made to figure 4 which shows the central part of the ignition system. The figure shows the electrical circuit of the vehicle where the battery (12V) is connected to the ignition lock S1, the fuse system, the relays K1, K2, K3 (7) and the coil 50.

It can be seen in figure 4 that the car's ignition is not turned on and the magnetic field coil is thereby not activated either. If we assume that the handbrake is pulled up, the pin will be in the locked position. When the driver now puts the key in the ignition lock and turns it, the electrical circuit is activated, the coil is live and the pin 40 is pulled out and the handbrake can be released.

The fundamental principle for the present invention is that the electrical system must be connected for it to be possible to release the handbrake. The handbrake can be reset from a neutral position to a locked position independent of the ignition system being turned on, but not the other way round.

The description given here concerns a mechanical brake system, but it can, of course, be valid for all types of parking brake systems.

Furthermore, it is possible to use other release mechanisms than an electrically driven electromagnetic coil. Thus, air pressure systems or hydraulics can also be used to prevent the unintended release of the parking brake of a vehicle.

Today's technology implies that one must use, for example, the original car key or an "opening system", i.e. open the car's computer system, for it to be possible to turn on the ignition. In today's cars, one can not turn on the ignition by simply connecting wires underneath the dashboard or under the bonnet.